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XVI.—*On Praniza and Anceus, and their Affinity to each other.*  
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[With two Plates.]

THE small Crustacea known by the names of *Anceus* and *Praniza* have long been objects of interest to naturalists. The peculiarity of their form and our ignorance of their habits have not only induced carcinologists to consider them as forming distinct genera, but even to group them in separate families.

Colonel Montagu described the first specimens in the seventh and eleventh volumes of the Linnæan Transactions, among other marine animals taken on the coast of South Devon. Dr. Leach believed that they might ultimately be found to be but different sexes of the same species, and this has been the opinion of many other naturalists.

There has been a mystery attendant upon their habits also. *Praniza* has frequently been taken associated with parasitic Crustacea: not so *Anceus*. Hence Colonel Montagu, Mr. Westwood, and M. Otto have considered *Praniza* to be a parasite upon certain animals. It has been taken, by Colonel Montagu, attached to the Father Lasher (*Cottus Scorpius*). On the other hand, it has been found quite as frequently, along with *Anceus* and other non-parasitic Crustacea, in the crevices of rocks and in shore-pools, as well as in deeper water. In the first of these positions it has been taken on the clayey shores of Strangford Loch by Mr. Haliday, who, I believe, is among those who hold most strongly the opinion that it is a separate species of animal from *Anceus*, his conclusion being based upon the structure of the oral organs. Here hypotheses have rested, until facts of greater or less importance should assist us in arriving at a correct conclusion.

On the 26th of November, 1856, a paper by M. Hesse of Brest was read by M. Coste before the Academy of Paris, in  
*Ann. & Mag. N. Hist. Ser. 3. Vol. ii.* 12

which it is stated that *Praniza* and *Anceus* are but two ages of one and the same animal; that, after having lived during a certain time under the form of *Praniza*, it assumes that of *Anceus*, and in this latter stage gives birth to young *Pranizæ*. The reverse of this appears to have been the idea of Mr. A. White, when he prophesied, in his recent 'Manual of the British Crustacea,' "that there is some likelihood that *Anceus* may prove to be one of the stages of *Praniza*."

M. Hesse's statements rest upon no hypothesis. They are the result of facts that he himself has witnessed, drawings of which accompany his memoir. The whole are now being submitted to a commission composed of MM. Duméril, Milne-Edwards, and Coste\*.

In studying the smaller forms of Crustacea, I have obtained many specimens of each of the animals in question; and though I have hitherto confined myself to the study of the *Amphipoda*, I am induced not to allow the data I possess upon the question to remain any longer concealed.

Before entering upon a discussion of the subject, it will be desirable to have a clear idea and just appreciation of the forms of the separate parts as well as of the general structure of both animals. I shall therefore commence by an examination of the adult *Praniza*.

The *cephalon* is quadrate. The eyes, sessile and prominent, are situated upon each side of the head. The *antennæ* are four, nearly equal. Posterior to the *cephalon* are two distinct segments, each supporting a pair of legs directed anteriorly. Then follow three membranous segments fused into one large oval division. This, together with the two preceding segments, and one, too insignificant to be observed by unassisted vision, form the *pereion*. It consists of six segments only. So also the *pleon*, which is much narrower than the *pereion*, and laterally carries two pairs of foliaceous appendages upon each of the six segments.

The general outline of the head appears to converge to a point anteriorly. This has universally been the accepted form of the animal,—a form that is due, not to the shape of the *cephalon*, which is, as I before observed, square, but to the shape and position of the *labium* and organs of the mouth.

The *labium* (Pl. VI. fig. 7 *d*<sup>ll</sup>) in *Praniza* is an important organ. It is large, and projects horizontally forwards. The anterior margin is concave, and considerably narrower than the posterior. From the centre of the anterior edge, after having traversed the inferior surface of the organ, projects a small siphon.

\* Since this paper has been in the press, the report confirming M. Hesse's views has been presented to the Academy by M. Milne-Edwards. See *Annals*, 3rd series, No. 8. p. 164.

The *mandibles* (*d*) originate from the inferior base of the *labium* and project horizontally forwards, lying immediately beneath and parallel with that organ; the tips of the former extend beyond the extremity of the siphon. The anterior half of the inner margin of each mandible is strongly denticulated.

The *maxilla* (*e, f*) originate posteriorly to the mandibles, are lanceolate in form, slightly curved, and serrated upon the inner margin.

The *maxillipedes* (*g*) consist of four or five articulations, from the anterior inner margin of each of which a long lanceolate process is produced.

There is but a single pair of *gnathopoda* (*h*); these consist of six articulations,—the *coxae* probably being fused, as is the case with all the other limbs, into the body of the animal. The *dactylos* of the *gnathopoda* is developed into a powerfully formed hook, both the limbs being directed horizontally forwards. This pair originates apparently from the ventral surface of the posterior part of the *cephalon*; but close observation, particularly in a lateral aspect, discloses a small segment behind, and distinct from the *cephalon* (Pl. VI. fig. 8 H). It is from this segment that the pair of *gnathopoda* originates.

The two next pairs of legs are homologous with the two anterior pairs of *pereiopoda* in *Amphipoda*. Each is laterally attached to a distinct segment, and directed forwards. It is chiefly upon this fact that Professor Dana has constituted his group *Anisopoda*. In this respect *Anceus* agrees with *Praniza*.

The three posterior pairs of legs are the three posterior *pereiopoda*, and are attached to one inflated membranous segment, the result of a fusion of the three posterior segments of the *pereion*.

The *pleon* is much narrower than the *pereion*. It consists of six distinct segments, each of which is furnished on each side with a pair of ciliated foliaceous appendages attached to a uniaarticulate peduncle. The posterior segment terminates in a point.

This description is taken from *Praniza cæruleata*. It is to be regretted that the name should have been adopted from the colour of the animal. I have received them of a bright grass-green from Mr. Loughrin of Polperro; blue, from the crevices in the slate in Plymouth Sound; and dredged them of an ash-grey, as well as transparent and a dirty-white, in five or six fathoms of water in the same locality. There can be no doubt, moreover, as stated by M.-Edwards, that *P. fuscata* of Johnston, which is described to be of a reddish-brown colour, is the same animal.

That we have more than one species is certain. Besides *cæruleata*, two specimens of a different species have been sent to me by Mr. Edwards of Banff. This species, to the eye, differs in

the more continuous and less graceful outline from the anterior part of the head to the posterior part of the *pereion*, the shortness of the *pleon*, and the smallness and more equal size of the *pereiopoda*; and in the less easy to be detected, but not less important facts, that the *mandibles* do not extend beyond the *labium*, and the *gnathopoda* have but four articulations and terminate in a rudimentary form. The powerful hook is wanting. One of this latter species, which I shall name *Edwardsii*, after its finder, who has been a valued correspondent during my researches in this class of animals, was charged with young. It is a remarkable fact, that in the young the organs generally bear a closer resemblance to those of *P. caruleata* than to those of their own parent species.

In the young the mandibles project beyond the labium. The *gnathopoda* are furnished at the extremity with powerful hooks. The siphon is prominent and well formed. The five conspicuous segments of the *pereion* correspond in their relation to each other, the centre one being the largest, and the posterior and anterior being equal and the smallest: no fusion exists between any of them. On the ventral surface of the four posterior segments is pendent a membranous sac. It is the monstrous enlargement of this sac in the development of the animal, fusing into one segment and separating widely apart the three posterior *pereiopoda*, that gives to this animal its most remarkable and peculiar feature.

In an examination of *Anceus* we find some points that assimilate and others that are widely distinct from the structure of *Praniza*. The eyes are sessile and placed anteriorly upon each side of the head. The *cephalon* is quadrate, depressed from the centre to the anterior margin; the lateral edges are raised like walls on each side.

The *antennae* (Pl. VII. fig. 3 *b, c*) are subequal, placed, as in *Praniza*, at the anterior lateral angles of the *cephalon*, and one immediately above the other.

The *labium* is absent or rudimentary.

The *mandibles* (*d*) are prominent and powerful; they originate at the anterior extremity of the *cephalon*, and extend horizontally in advance of the head.

The *maxillipedes* (*g*) consist of five articulations, a projecting process arising from the basal one.

The *gnathopoda* (*h*) consist of two articulations, one large and the other very small. The large one is straight on the exterior and convex on the interior margin; the latter is ciliated and laps over the corresponding margin of the opposite *gnathopod*. The whole forms a squamiform and efficient operculum to the organs of the mouth.

The succeeding segments are as broad as the *cephalon*.

The three posterior segments of the *pereion* are slightly narrower, and imperfectly fused together.

The *pereiopoda* bear a close general resemblance to those of *Praniza*, though somewhat more tuberculated.

The *pléon* is much narrower than the *pereion*, and consists of six segments, each of which is furnished on each side with a pair of ciliated foliaceous appendages attached to a uni-articulate peduncle. The posterior segment terminates in a point.

Upon comparison, therefore, of *Praniza* with *Anceus*, we find differences as important as those which usually exist between genera or even families. Hence their classification by naturalists into separate genera, as *Anceus* and *Praniza*, each of which has been taken as the type of a particular group or family.

Other observers, knowing the frequent distinction that exists between the forms of the different sexes of the same species, have assumed that the distinction between *Anceus* and *Praniza* is one of sex only. To this idea I had a considerable inclination.

Examination of the details of both animals shows us no distinction that is not reconcilable with this idea. The *mandibles* resemble each other in form and position, and differ only in size and strength. The *labium* is absent in *Anceus*, and developed into a *siphon* in *Praniza*,—a distinction, I am informed by Professor Kinahan, that was first pointed out by Mr. Haliday. But that this may be only a sexual distinction, we may infer from the fact that the males of parasitic Isopods differ in a similar respect from their sedentary females.

I have hitherto been inclined to believe that all *Pranizæ* were females;—that the great membranous enlargement which is separated into four divisions upon the ventral surface was a pouch for the development of the ova, and the homologue of the pouch that is carried upon the ventral surface of the *pereion* in all the Edriophthalmous Crustacea.

There is certainly nothing in the young of *Praniza* from which we could assume that an *Anceus* might not be developed. This appears still more correct when the larva has grown a little, as may be seen in fig. 3. Pl. VI., where the form is intermediate between *Praniza* and *Anceus*.

Recently M. Hesse has astonished us by the statement that *Anceus* is the adult animal, and that *Praniza* is the young;—that he has, if I understand correctly from the short notice in the 'Comptes Rendus\*,' witnessed not only the change of the former into the latter, but, moreover, the reproduction of the latter from *Anceus*.

\* March 22, 1858, p. 568.

The experience of M. Hesse is quite at variance with my own observations. The larva which I have figured in Pl. VI. fig. 2 is one of about twenty that I obtained from the *Praniza* I have given in fig. 1. It appears therefore that some fallacy must have crept into the researches of M. Hesse, since *Praniza* is evidently an adult animal. The mysterious law governing reproduction under the phase of alternation of generations can scarcely account for the discrepancy, since the young of *Praniza* bear to the parent as close a resemblance as is found usually to exist between the old and young. They differ only in the relative proportion of certain parts; and others, which are not required until the age of puberty, are necessarily in abeyance.

M. Hesse says that *Anceus* bears young. This fact being discovered by him, proves that there are female *Ancei*. This, together with the fact that I have stated relative to *Praniza*, demonstrates the error of M. Hesse's hypothesis, "that *Praniza* is the early stage of *Anceus*," and goes far to establish the foregone conclusions of previous naturalists, that the two animals belong to distinct genera.

M. Hesse says not only that *Anceus* bears young, but that these young are *Praniza*. We know, from experience in observation, that the larvæ of any given tribe of Crustacea are generically similar: as I have previously shown, there is a considerable resemblance between the young of *Praniza* and the adult *Anceus*; so therefore we may infer that the general resemblance of the larva of *Anceus* to the larva of *Praniza* is considerable,—a circumstance that may account for M. Hesse's assumption that the former are *Pranizæ*.

I think we may, from what is known, deduce the following conclusions:—

That (upon M. Hesse's observation) *Anceus* is an adult animal.

That (upon our own observation) *Praniza* is an adult animal.

That *Praniza* consequently cannot be developed into *Anceus*.

That *Anceus* is a distinct genus from *Praniza*.

That the males of both genera have yet to be discovered.

The males of both *Anceus* and *Praniza* have to be made out; but it is not rash to infer that they may so nearly resemble the females, as to make it a test of considerable difficulty.

I have recorded that in *Praniza Edwardsii* the gnathopoda have an immature character, while in *P. caruleata* they possess the appearance of an efficient organ. It is not improbable that this may be a sexual distinction in every species of *Praniza*: to this inference I am led by the fact that all the larvæ of *Praniza Edwardsii* possess the powerful hook seen in *P. caruleata*, while it is absent in the parent. I have elsewhere expressed a conviction that the larvæ of Crustacea possess at an early

stage the rudiments of both sexes,—a circumstance which, if correct, would account for the gnathopoda being different in the larva from the same organs in the adult female. I hope to be enabled to set this point at rest before it is embodied in the work I have in hand.

With regard to *Anceus*, I have as yet no experience to lead me to any conclusion.

There is a mystery in the production of the ova of *Praniza* that would well repay the embryologist for studying. I have before observed that they are occasionally taken transparent, white, ash-grey, green, blue, and red-brown. These varieties of colour appear to be dependent upon the progress made in the advancement towards spawning, or in some way connected with the development of the ova.

When the animal is blue, I have observed a double line of ova traversing the length of the enlarged segment, as seen in fig. 4, Pl. VI., and figs. 7, 7", Pl. VII. This I presume to be the ovary or the oviduct previous to the escape of the ova into the incubatory pouch, which they ultimately fill, to the apparent annihilation of the other contents of this part of the animal.

I have watched specimens in a glass, and perceived, after a few days, that the blue mass, which at first appeared to fill and distend the large segment of the *pereion*, gradually diminished, apparently deteriorating. It recedes first from the margin. In so doing, it displayed a series of layers, placed one before the other, lying across the animal. There were indications also of these layers being divided by cross-sections. It is from one so depauperized that fig. 4 in each plate is taken. The ova ultimately fill the pouch, first as seen at fig. 6. Pl. VII., and ultimately as shown in fig. 8, where the embryo has considerably advanced towards completion.

The blue appearance is now changed to a brown,—a circumstance that is due to the reddish pigment-cells which mark the *pereion* of the young animal.

The nervous system is similar to that of other Isopoda. The ganglia of the three posterior fused segments are distinct, and an intermediate branch is given off on each side from the nervous cord, between each ganglion. One cord only appears to be given off on each side of every ganglion except the one preceding the last three of the *pereion*; this appears to give off three upon each side. Those within the *cephalon* I could not distinctly make out; but, without being fused, two ganglia appeared to be brought close together. Possibly the ganglion belonging to the suppressed gnathopoda may be present.

The animal is small, but the nervous system is readily detectable along the ventral surface of the undissected creature.

## EXPLANATION OF PLATES.

## PLATE VI.

- Fig. 1. *Praniza Edwardsii*: 1 *g*, maxilliped; 1 *h*, gnathopod.  
 Fig. 2. Larva of ditto.  
 Fig. 3. Ditto, older, of *cæruleata*?  
 Fig. 4. *Praniza cæruleata*: 4 *b*, upper antenna; 4 *c*, lower ditto; 4 *f*, maxilla; 4 *g*, maxilliped; 4 *h*, gnathopod.  
 Fig. 5. Cephalon and appendages (dorsal surface): *b*, superior antenna; *c*, inferior ditto; *d'*, labium; *h*, gnathopod; 5 *a*, part of the eye enlarged.  
 Fig. 6. Labium enlarged (from below): *d''*, siphon; *d*, mandible; *b*, antenna (inferior).  
 Fig. 7. Cephalon and appendages (ventral aspect): *a*, eye; *d*, mandible (turned back); *d''*, labium and siphon; *e, f*, maxillæ; *g*, maxilliped; *h*, gnathopod.  
 Fig. 7 *d'''*. Ditto, lateral view.  
 Fig. 8. Lateral view of head and anterior part of *pereion*.  
 Fig. 9. Ditto of *pleon* and posterior part of *pereion*.  
 Fig. 10. Nervous system.

## PLATE VII.

[The four lines at the top of Plate VII. represent the natural sizes of the larva at the time of being hatched, and a little later, of *Anceus maxillaris* and *Praniza cæruleata* respectively.]

- Fig. 1. *Anceus maxillaris*.  
 Fig. 2. Cephalon, lateral view.  
 Fig. 3. Ditto, seen from below: *b*, upper antenna; *c*, lower ditto; *d, d*, mandibles; *h*, gnathopod; 3 *g*, maxilliped; 3 *h*, gnathopod; *h''*, cilia enlarged.  
 Fig. 4. Ventral aspect of body of *Praniza*.  
 Fig. 5. Ditto of *Anceus*.  
 Fig. 6. Ova of *Praniza* (early stage).  
 Fig. 7. *Pereion* of *Praniza* with ova: 7'', ova of same.  
 Fig. 8. *Pereion* of *Praniza* with ova; 8'', ova of same.

Plymouth, July 20, 1858.

XVII.—Remarks on *Lepas anatifera*, Linn.

By GEORGE LAWSON, Ph.D.

ON the 9th July, 1858, while the steam-ship 'Dundalk' was passing through Banff Bay, on her passage from Inverness to Granton, the attention of the crew and passengers was attracted by a remarkable object floating in the water, which was at first supposed to be a huge fish. A closer examination proved it to be a squared log of fir-timber, somewhere about thirty feet in length, *completely covered throughout its entire lower surface* with a dense crop of barnacles.

The log was brought to Granton Pier, whence I obtained a supply of specimens for examination. The species is *Lepas*